IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

APPLICANT: Robert H. Wolfe, Jr. | **Examiner:** Stevens, Thomas H.

SERIAL NO.: 09/500,293 | **Group**: Art Unit: 2123

FILED: February 8, 2000 | **Docket**: YOR919990254US1 (8728-293)

FOR: **SYSTEM AND METHOD FOR SIMULTANEOUS CONSTRUCTION OF PHYSICAL AND CAD MODELS**

Mail Stop: Appeal Brief Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Sir:

Enclosed please find APPELLANTS' APPEAL BRIEF.

The amount of $500.00 is hereby authorized to be charged Deposit Account No.**50-0510/IBM** (Yorktown Heights). Please charge any deficiency as well as any other fee(s) which may become due under 37 C.F.R. 1.16 and/or 1.17, at any time during the pendency of this application, or credit any overpayment of such fee(s), to Deposit Account No. 50-0510/IBM (Yorktown Heights).

Respectfully submitted,

Frank V. DeRosa
Reg. No. 43, 584

F. CHAU & ASSOCIATES, LLC
130 Woodbury Road
Woodbury, NY 11797
Tel: (516) 692-8888
Fax: (516) 692-8889

CERTIFICATE OF MAILING UNDER 37 C.F.R. §1.8(a)

I hereby certify that this correspondence and accompanying documents were deposited with the United States Postal Service as first class mail, postpaid in an envelope, addressed to the: Mail Stop Appeal Brief Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date indicated below.

Dated: 2/14/05

Frank V. DeRosa

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant: Robert Wolfe

Examiner: Thomas H. Stevens

Serial No.: 09/500,293

Group: Art Unit 2123

Filed: February 8, 2000

Docket: YO999-254 (8728-293)

For: SYSTEM AND METHOD FOR SIMULTANEOUS CONSTRUCTION OF PHYSICAL AND CAD MODELS

APPEAL BRIEF

Appeal from Group 2123

F. Chau & Associates, LLC
130 Woodbury Road
Woodbury, New York 11797
TEL: (516) 692-8888
FAX: (516) 692-8889
Attorneys for Appellant

TABLE OF CONTENTS

I. INTRODUCTION

This Appeal is from a Final Office Action mailed on April 2, 2004 (Paper No. 7) (hereinafter, referred to as the "FINAL ACTION") finally rejecting claims 1-37 of the above-identified application. Applicant commenced this Appeal by a Notice of Appeal filed on August 12, 2004, and hereby submits this Appeal Brief in furtherance of the Appeal.

II. REAL PARTY IN INTEREST

The real party in interest for the above-identified application is International Business Machines Corporation, the assignee of the entire right, title and interest in and to the subject application by virtue of an assignment of recorded in the U.S. Patent and Trademark Office at reel/frame 010601/0875.

III. RELATED APPEALS AND INTERFERENCES

There are no Appeals or Interferences known to Applicant, Applicant's representatives or the Assignee, which would directly affect or be indirectly affected by or have a bearing on the Board's decision in the pending Appeal.

IV. STATUS OF CLAIMS

Claims 1-37 are pending, stand rejected and are under appeal. The claims are set forth in the attached Appendix. Claims 1, 15 and 27 are independent claims. Claims 2-14 depend directly or indirectly from claim 1, claims 16-26 depend directly or indirectly from claim 15, and claims 28-37 depend directly or indirectly from claim 27.

V. STATUS OF AMENDMENTS

No claim amendments have been filed or entered subsequent to the FINAL ACTION.

VI. SUMMARY OF CLAIMED SUBJECT MATTER

Exemplary embodiments of the invention generally include systems and methods that enable simultaneous construction of a *physical model* and a corresponding *CAD model* (virtual model), wherein the *CAD model* comprises a plurality of *CAD representations* each corresponding to a *physical component part* that is used to construct the *physical model.* During construction of a *physical model* using individual *physical component parts*, a CAD application renders a *CAD representation* for a given *physical component part* (e.g., automatically identified (and retrieved from a CAD library) or generated (custom part) using a tracking system). The CAD system processes data received from the tracking system which is used to track the position and orientation of the *physical component part* with respect to the *physical model* as the *physical component part* is maneuvered into a desired position in the *physical model* and to determine the corresponding position and orientation of the rendered *CAD representation* of the *component part* with respect to *the CAD model.* The CAD system includes methods for determining/mapping coordinate systems of the *CAD model*, *physical model*, *component part*, etc. During assembly of the *physical model* using *physical component parts*, the CAD system can render an updated image of the corresponding *CAD model* as *each physical component part* is placed in the *physical model.*

Independent claims 1, 15 and 27 are representative of claimed inventions that broadly embody features as described above.

Claim 1 recites:

> A *CAD (computer-aided design) system, comprising:*
>
> *a data processing system comprising a CAD application, the CAD application being executed by the data processing system to generate a CAD model of a physical model, the CAD model comprising a plurality of CAD representations each corresponding to a component part of the physical model; and*
>
> *a tracking system for generating tracker data associated with a given component part, wherein the tracker data is processed by the data processing system to generate a CAD representation of the given component part and determine the position and orientation of the component part with respect to the physical model as the component part is placed in a desired position in the physical model.*

For purpose of illustration, the invention of claim 1 will be described with reference to the exemplary system depicted in FIG. 1, and corresponding text of Applicant's Specification ("Spec.") for example, but nothing herein shall be deemed as a limitation on the scope of the invention. FIG. 1 illustrates a CAD (computer-aided design) system (10). The system (10) comprises a data processing system (11) comprising a CAD application (15). The CAD application (15) is executed by the data processing system (11) to generate a CAD model (17) (and as displayed (27)) of a physical model (18). The CAD model (17, 22) comprises a plurality of CAD representations each corresponding to a component part of the physical model (18). A

tracking system (e.g., 21 and 22) is provided for generating tracker data associated with a given component part (26), wherein the tracker data is processed by the data processing system (11) to generate a CAD representation of the given component part (26) and determine the position and orientation of the component part (26) with respect to the physical model (18) as the component part (26) is placed in a desired position in the physical model (18) (see e.g., Spec., p.8, line 5 ~ p. 10, line 14).

Claim 15 recites:

> A *method for generating a CAD (computer-aided design) model of a corresponding physical model comprising a plurality of component physical parts, the method comprising the steps of:*
>
> *generating a CAD representation of a given component physical part based on relevant points of the component physical part;*
>
> *tracking coordinates of the relevant points of the CAD representation of the component physical part in relation to coordinates of the CAD model as the physical component part is placed in a desired position in the physical model; and*
>
> *adding the CAD representation of component physical part to the CAD model such that the CAD model comprises an ensemble of individual CAD representations of component physical parts.*

Claim 27 recites:

> A *program storage device readable by a recognition machine, tangibly embodying a program of instructions executable by the machine to perform method steps for generating a CAD (computer-aided design) model of a*

corresponding physical model comprising a plurality of component physical parts, the method comprising the steps of:

generating a CAD representation of a given component physical part based on relevant points of the component physical part;

tracking coordinates of the relevant points of the CAD representation of the component physical part in relation to coordinates of the CAD model as the physical component part is placed in a desired position in the physical model; and

adding the CAD representation of component physical part to the CAD model such that the CAD model comprises an ensemble of individual CAD representations of component physical parts.

For purpose of illustration, the inventions of claim 15 and 27 will be described with reference to the exemplary systems and methods depicted in FIGs. 3 and 10 and corresponding text of Applicant's Spec., for example, but nothing herein shall be deemed as a limitation on the scope of the invention.

For instance, FIG. 3 depicts *generating a CAD representation of a given component physical part based on relevant points of the component physical part* (e.g., steps 300, 303, 304, 305) (see, p. 19, line 15 ~ p. 23, line 15) and *tracking coordinates of the relevant points of the CAD representation of the component physical part in relation to coordinates of the CAD model as the physical component part is placed in a desired position in the physical model* (see, e.g., step 310, FIG. 3 (p. 25, lines 8-20); FIG. 2 (p.13, line 21~ p. 15, line 16)). Further, FIG. 10 depicts *adding the CAD representation of component physical part to the CAD model such that*

the CAD model comprises an ensemble of individual CAD representations of component physical parts (see, e.g., Spec. p. 45, line 5 ~ p. 46, line 18).

In another claimed embodiment (**Claim 2**), the CAD system comprises a library (16) for storing *CAD representations* of *component parts* (19) used for constructing the *physical model* (18) (see, e.g., FIG. 1; Spec., p. 8, line 22 ~ p. 9, line 5).

In another claimed embodiment (**Claim 3**), the tracking system comprises a *stationary tracker source* (TS) (21), and a *sensor circuit* (43) embedded in the given component part (40) for sensing the position of the given component part with respect to the TS (21) and for generating the tracker data. The sensor circuit (43) stores a part identification (ID) code that is transmitted to the data processing system (11) for the CAD application (15) to retrieve a CAD representation from the library (16) based on the part ID code (see, e.g., FIGs. 1 and 4D; Spec. p.12, lines 16-23).

In another claimed embodiment (**Claim 4**), the tracking system comprises a stationary tracker source (TS) (21), and a tracker free member (TFM) (22) for sensing its position with respect to the TS (21) and generating the tracker data, wherein the TFM (22) comprises a docking mechanism (22b, 22c) for connecting the TFM (22) to the given component part (40) at a docking position on the given component part (40) (see, e.g., FIGs. 1 and 4a~4c, p. 9, line 23~ p. 12, line 15).

In other claimed embodiments, the docking mechanism (22b) of the TFM (22) insertably engages a receptacle (41, 41a) on the given component part (40) **(Claim 6)** (see, FIGs 4a, 4b). In one embodiment, a part ID (identification) of the given component part (40) is encoded by the shape of the receptacle (41), and wherein the docking mechanism (22b) of the TFM (22) senses the shape of the receptacle (41) to identify the part (40) and send a signal (via 22a) to the data processing system (11) to retrieve a CAD representation from the library (16) based on the part ID **(Claim 7)** (see, e.g., FIGs. 1, 4a; Spec., p. 10, line 23 ~ p. 11, line 15).

In another claimed embodiment, the given component part (40) comprises a microchip (42) having a part ID code, the microchip (42) being electrically coupled to the docking mechanism (22b) of the TFM (22) upon connection of the TFM (22) to the given component part (40) so as to transmit the part ID to the data processing system (11) to retrieve a CAD representation from the library (16) based on the part ID **(Claim 8)** (see, e.g., FIGs. 1, 4b; Spec., p. 11, lines 16-22).

In another claimed embodiment **(Claim 10)**, the system includes a marking jig (e.g., 23, 24, 25) (see, e.g., FIGs. 1 and 5) for measuring tracker data of relevant points of the given component part to generate a CAD representation of the given component part (see, e.g., Spec., p. 13, lines 3-20).

VII. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-37 stand rejected under 35 U.S.C. §102(b) as being unpatentable over U.S. Patent No. 5,778,177 to AZAR.

Thus, the issue on appeal is whether AZAR is legally sufficient to establish a *prima facie* case of anticipation against any of claims 1-37.

VIII. ARGUMENTS

A. The teachings of AZAR Cannot Support a *Prima Facie* Case Of Anticipation Against Any of Claims 1 – 37

For a claim to be anticipated under 35 U.S.C. § 102, all elements of the claim must be found in a single prior art reference (see, e.g., Scripps Clinic & Research Found. v. Genentech Inc., 927 F.2d 1565, 1576, 18 U.S.P.Q.2d. 1001, 1010 (Fed. Cir. 1991)). The identical invention must be shown in as complete detail as is contained in the claim. (See MPEP § 2131). The single prior art reference must disclose all of the elements of the claimed invention functioning essentially in the same manner (see, e.g., Shanklin Corp. v. Springfield Photo Mount Corp, 521 F.2d 609 (1st Cir. 1975)).

In the case at bar, AZAR is legally deficient to establish *prima facie* case of anticipation against any of claims 1-37. Indeed, as explained below, the Examiner's reliance on AZAR is wholly misplaced because AZAR clearly fails to disclose various elements of each claim 1-37.

AZAR is directed to a system that enables scanning of an object or a surface to obtain information, e.g., geometrical dimensions of the object or the topology of the surface, which information is processed by a CAD application to generate and display a computer generated image of the object or surface and enable interactive display and manipulation of the virtual image of the object (see, e.g., Col. 1, lines 26-43). More specifically, as depicted in FIG. 2 of AZAR, an interactive scanning device (10) includes a scanner (12), image processor (13) (having a computer processor 13a and CAD storage (13b) for storing a CAD program) and input device (11). The scanner (12) is used to scan an object or surface of the object to capture information regarding the geometrical dimensions of the object or topological information associated with a surface of the object. The CAD program (13b) is executed by the image processor to enable interactive display and manipulation of the scanned (virtual) object or surface on the display unit (14) via the input devices (11) (see, e.g., Col. 2 lines 26 ~ Col. 3, line 5).

As will be demonstrated below, the Examiner has not met his burden of establishing a *prima facie* case of anticipation of claims 1-37 based on AZAR. In the FINAL ACTION, the Examiner's anticipation analysis begins with a description of the teachings of AZAR (see, e.g., pp. 3-4) including a description similar to that set forth above. Thereafter, for each claim 1-37, the Examiner simply reiterates the exact claim language, followed by a general recitation of one or more sections of AZAR that Examiner contends discloses the claimed invention, but fails to explain with any reasonable degree of specificity, how the various claim elements are disclosed in the cited sections of AZAR relied on by Examiner. In fact, the Examiner's reliance on AZAR is *bewildering* because most, if not all, of the elements of the claimed inventions are glaringly

absent from, and not even remotely suggested by, the disclosure of AZAR, as will be readily apparent to the Board.

(i) **AZAR Does Not Anticipate Claim 1**

The rejection of claim 1 (pp. 4-5 of the FINAL ACTION) consists merely of a recitation of claim 1, followed by citation to Col. 2, lines 19-67 of AZAR. However, AZAR clearly does not disclose various elements of claim 1.

For example, AZAR does not disclose *a CAD application being executed by a data processing system to generate a CAD model of a physical model, the CAD model comprising a plurality of CAD representations each corresponding to a component part of the physical model,* as recited in claim 1.

In particular, although AZAR arguably discloses a CAD application (13b) for generating a computer image of a scanned object, AZAR does not teach that the CAD application (13b) generates a CAD model which comprises a plurality of CAD representations, where each CAD representation corresponds to a component part of a physical model. To begin, on a fundamental level, AZAR clearly does not disclose a "physical model" comprising component parts as contemplated by the invention. Even assuming that a scanned object in AZAR can be interpreted as a "physical model", it is clear that AZAR does not disclose or suggest that the resulting object image (or CAD model) comprises *a plurality of CAD representations each corresponding to a component part of the physical model* (or object).

Moreover, even assuming that the scanned object in AZAR may be construed as a "component part", there is nothing in AZAR that even remotely teaches, either expressly or inherently, using the "component part" to construct a physical model of component parts.

Furthermore, AZAR clearly fails to disclose *a tracking system for generating tracker data associated with a given component part, wherein the tracker data is processed by the data processing system to generate a CAD representation of the given component part and determine the position and orientation of the component part with respect to the physical model as the component part is placed in a desired position in the physical model.*

As explained above, AZAR discloses a scanning device to scan an object and capture geometric information, i.e., the dimensions of an object or topology of a surface, which is used to generate a computer (virtual) image of the object. The CAD program (13b) enables interactive display and manipulation of the scanned (virtual) object or surface on a display unit (14) via the input devices (11). However, it is clear that there is nothing in AZAR that even remotely teaches that the CAD program (13b) processes such captured geometric information *to determine the position and orientation of the component part with respect to the physical model as the component part is placed in a desired position in the physical model.*

Indeed, on a fundamental level, AZAR does not even disclose means for tracking the position and orientation of a scanned physical object, much less tracking the position and orientation of the scanned object with respect to a physical model as the scanned object is placed

in a physical model. Again, although the CAD program (13b) of AZAR processes the captured geometric information of the object to generate an image of the object, it is abundantly clear that the AZAR system does not determine the position and orientation of the object with respect to a physical model. In fact, as noted above, there is simply no teaching in AZAR of building a physical model.

In the Response to Arguments (pp. 2-3 of the FINAL ACTION), the Examiner essentially contends that AZAR "inherently" teaches *determining the position and orientation of a component part* because AZAR "scans images or components in order to manipulate their position or orientation via a monitor and computer" (see, p. 3 of the FINAL ACTION). This argument is irrelevant to the claimed invention and essentially misses the point. In fact, Examiner's position in this regard demonstrates a fundamental lack of understanding of either the teachings of AZAR, the claimed inventions, or both.

Indeed, although AZAR may inherently disclose that the CAD program (13b) can track the position and orientation of the *virtual object* (image) in the *model (virtual) space* as the image is manipulated in *image space* on the image display, this does not teach or suggest processing tracker data to *determine the position and orientation of the component part with respect to the physical model as the component part is placed in a desired position in the physical model*. In other words, the Examiner's reliance on AZAR's teaching of manipulation of an image in image space, utterly ignores, and fails to consider, the claim language regarding to the *position and orientation of the component part with respect to the physical model*. Indeed, the 3D

manipulation of the rendered (and displayed) object in the AZAR system does not require tracking the position and orientation of a physical object as it is placed in the physical model.

(ii) AZAR Does Not Anticipate Claims 15 and 27

The Examiner's anticipation rejection of claims 15 and 27 is equally meritless for at least the same or similar reasons given above for claim 1. Indeed, without further elaboration required, it is clear that Examiner's reliance on AZAR as anticipating claims 15 and 27 is wholly misplaced, as AZAR clearly does not disclose or remotely suggest, e.g.,

tracking coordinates of the relevant points of the CAD representation of the component physical part in relation to coordinates of the CAD model as the physical component part is placed in a desired position in the physical model; and

adding the CAD representation of component physical part to the CAD model such that the CAD model comprises an ensemble of individual CAD representations of component physical parts.

(iii) AZAR Does Not Anticipate Claims 3, 4, 6, 7, 8 and 10

Appellant respectfully submits that in view of the clearly distinct teachings of AZAR, one could readily see that the anticipation rejections of all remaining dependent claims are glaringly erroneous. In fact, Appellant is confident that the erroneousness of the anticipation rejections will be readily apparent to the Board, without having to elaborate much further than simply reciting the claim language. In any event, as noted above, other than citation to irrelevant

sections of AZAR, the Examiner has failed to explain the basis for any of the anticipation rejections with any reasonable degree of specificity.

For example, with respect to claim 3, there is absolutely nothing in AZAR that teaches or even remotely suggests, for example, a tracking system comprising a *stationary tracker source*, and a *sensor circuit* embedded in the given component part for sensing the position of the given component part with respect to the TS. In particular, by way of example, AZAR clearly does not remotely disclose a scanned object having an embedded sensor.

Furthermore, with respect to claim 4, AZAR clearly does not disclose or suggest *a tracking system comprising a stationary tracker source (TS), and a tracker free member (TFM), much less a TFM that includes a docking mechanism for connecting the TFM to the given component part at a docking position on the given component part.* In fact, AZAR does not even disclose connecting the scanning system, or any other tracking system, to the scanned object.

Moreover, with respect to claim 6, it is utterly bewildering how Examiner could even contend that AZAR discloses a TFM that includes a docking mechanism which insertably engages a receptacle on the given component part. This is simply not disclosed or remotely suggested by AZAR.

Furthermore, with respect to claim 7, there is no basis, whatsoever, for Examiner's reliance on AZAR as disclosing, e.g., *encoding a part ID (identification) of the given component*

part by the shape of the receptacle, wherein the docking mechanism of the TFM senses the shape of the receptacle to identify the component part. AZAR simply does not disclose or suggest these features. In addition, with respect to claim 8, Examiner's reliance on AZAR as disclosing, e.g., *a given component part comprising a microchip having a part ID code,* is glaringly misplaced.

By way of further example, with respect to claim 10, the Examiner cannot show, and has not shown, that AZAR discloses a marking jig for measuring tracker data of relevant points of the given component part to generate a CAD representation of the given component part.

B. CONCLUSION

Therefore, for at least the above reasons, it is respectfully requested that the Board reverse all claim rejections under 35 U.S.C. 102(b).

Frank DeRosa
Reg. No. 43,584

F. Chau & Associates, LLC
130 Woodbury Road
Woodbury, New York 11797
TEL: (516) 692-8888
FAX: (516) 692-8889

APPENDIX A

1. A CAD (computer-aided design) system, comprising:

a data processing system comprising a CAD application, the CAD application being executed by the data processing system to generate a CAD model of a physical model, the CAD model comprising a plurality of CAD representations each corresponding to a component part of the physical model; and

a tracking system for generating tracker data associated with a given component part, wherein the tracker data is processed by the data processing system to generate a CAD representation of the given component part and determine the position and orientation of the component part with respect to the physical model as the component part is placed in a desired position in the physical model.

2. The system of claim 1, further comprising a library for storing CAD representations of component parts used for constructing the physical model.

3. The system of claim 2, wherein the tracking system comprises:

a stationary tracker source (TS); and

a sensor circuit embedded in the given component part for sensing the position of the given component part with respect to the TS and for generating the tracker data, wherein the sensor circuit stores a part identification (ID) code that is transmitted to the data processing

system for the CAD application to retrieve a CAD representation from the library based on the part ID code.

4. The system of claim 2, wherein the tracking system comprises:

a stationary tracker source (TS); and

a tracker free member (TFM) for sensing its position with respect to the TS and generating the tracker data, wherein the TFM comprises a docking mechanism for connecting the TFM to the given component part at a docking position on the given component part.

5. The system of claim 4, wherein the docking position is one of arbitrary and pre-determined.

6. The system of claim 4, wherein the docking mechanism of the TFM insertably engages a receptacle on the given component part.

7. The system of claim 6, wherein a part ID (identification) of the given component part is encoded by the shape of the receptacle, and wherein the docking mechanism of the TFM senses the shape of the receptacle to identify the part and send a signal to the data processing system to retrieve a CAD representation from the library based on the part ID.

8. The system of claim 6, wherein the given component part comprises a microchip having a part ID code, the microchip being electrically coupled to the docking mechanism of the

TFM upon connection of the TFM to the given component part so as to transmit the part ID to the data processing system to retrieve a CAD representation from the library based on the part ID.

9. The system of claim 4, wherein the docking mechanism comprises one of a suction device and an adhesion device.

10. The system of claim 4, further comprising a marking jig for measuring tracker data of relevant points of the given component part to generate a CAD representation of the given component part.

11. The system of claim 10, wherein the marking jig comprises a fixed reference point.

12. The system of claim 10, wherein the relevant points include at least one corner of the given component part.

13. The system of claim 10, wherein the relevant points include all corners of the given component part.

14. The system of claim 10, wherein the marking jig is configured for measuring tracker data associated with a radius of the given component part.

15. A method for generating a CAD (computer-aided design) model of a corresponding physical model comprising a plurality of component physical parts, the method comprising the steps of:

generating a CAD representation of a given component physical part based on relevant points of the component physical part;

tracking coordinates of the relevant points of the CAD representation of the component physical part in relation to coordinates of the CAD model as the physical component part is placed in a desired position in the physical model; and

adding the CAD representation of component physical part to the CAD model such that the CAD model comprises an ensemble of individual CAD representations of component physical parts.

16. The method of claim 15, wherein the step of generating a CAD representation of the component physical part comprises the steps of:

connecting a tracker free member (TFM) to the component physical part at a docking position on the component physical part;

obtaining coordinate data for each of the relevant points of the component physical part;

processing the coordinate data for each of the relevant points to determine the position and orientation of each of the relevant points of the component physical part in relation to the TFM..

17. The method of claim 16, further comprising the step of rendering an image of the component physical part attached to the TFM using the processed coordinate.

18. The method of claim 16, wherein the step of obtaining coordinate data for each of the relevant points of the component physical part comprises the steps of:

obtaining a part identification (ID) code associated with the component physical part; and

retrieving pre-stored geometry data and docking position data associated with the component physical part based on the part ID code.

19. The method of claim 18, wherein the step of obtaining a part ID code comprises the steps of:

insertably engaging a docking mechanism of the TFM with a docking receptacle of the component physical part;

encoding the part ID based on a shape of the docking receptacle;

sensing the shape of the docking receptacle; and

transmitting a corresponding part ID from the TFM based on the sensed shape of the docking receptacle.

20. The method of claim 18, wherein the step of obtaining a part ID code comprises the steps of:

insertably engaging a docking mechanism of the TFM with a docking receptacle of the component physical part to operatively connect the docking mechanism to a microchip in the component physical part;

retrieving the part ID from the microchip; and

transmitting the retrieved part ID from the TFM.

21. The method of claim 16, wherein the step of obtaining coordinate data for each of the relevant points of the component physical part comprises the steps of:

obtaining pre-stored geometry data of the relevant points associated with the component physical part;

measuring coordinates of a portion of the relevant points of the component part;

comparing the measured coordinates with the pre-stored geometry data;

computing the docking position of the TFM on the component physical part, if a match is found between the measured coordinates and the geometry data of corresponding relevant points;

determining a remainder of the relevant points of the component physical model based on the computed docking position and geometry data.

22. The method of claim 21, further comprising the steps of:

rendering images of the component physical part each having an alternative docking position, if a match is not found between the measured coordinates and the geometry data; and

selecting the image with a desired docking position.

23. The method of claim 16, wherein the step of obtaining coordinate data for each of the relevant points of the component physical part comprises the steps of:

measuring the coordinates of successive relevant points of the component part;

rendering an image of the component physical part, wherein the image is dynamically generated by connecting a line from a current measured point to a last measured point; and

re-connecting the line from the current measured point to any previous measured point, if the rendering of the connection between the current measured point and last measured point is an incorrect depiction of the component physical part.

24. The method of claim 16, wherein the step of processing the coordinate data for each of the relevant points to determine the position and orientation of each of the relevant points of the component physical part in relation to the TFM comprises the steps of:

computing coordinates of the docking position of the TFM on the component physical part; and

transforming the coordinates of the relevant points to the coordinates of the TFM using the computed docking position.

25. The method of claim 15, further comprising the step of refining the CAD representation before adding the CAD representation to the CAD model.

26. The method of claim 15, further comprising the step of storing the CAD representation of the component physical part in a CAD library.

27. A program storage device readable by a recognition machine, tangibly embodying a program of instructions executable by the machine to perform method steps for generating a CAD (computer-aided design) model of a corresponding physical model comprising a plurality of component physical parts, the method comprising the steps of:

generating a CAD representation of a given component physical part based on relevant points of the component physical part;

tracking coordinates of the relevant points of the CAD representation of the component physical part in relation to coordinates of the CAD model as the physical component part is placed in a desired position in the physical model; and

adding the CAD representation of component physical part to the CAD model such that the CAD model comprises an ensemble of individual CAD representations of component physical parts.

28. The program storage device of claim 27, wherein the instructions for performing the step of generating a CAD representation of the component physical part comprise instructions for performing the steps of:

obtaining coordinate data for each of the relevant points of the component physical part;

processing the coordinate data for each of the relevant points to determine the position and orientation of each of the relevant points of the component physical part in relation to

coordinates of a tracker free member (TFM) attached to the component physical part at a docking position on the component physical part.

29. The program storage device of claim 28, further comprising instructions for performing the step of rendering an image of the component physical part attached to the TFM using the processed coordinates.

30. The program storage device of claim 28, wherein the instructions for performing the step of obtaining coordinate data for each of the relevant points of the component physical part comprise instructions for performing the steps of:

receiving a part identification (ID) code associated with the component physical part; and

retrieving pre-stored geometry data and docking position data associated with the component physical part based on the part ID code.

31. The program storage device of claim 30, wherein the part ID code is received from one of the TFM or by user input.

32. The program storage device of claim 28, wherein the step of obtaining coordinate data for each of the relevant points of the component physical part comprises the steps of:

obtaining pre-stored geometry data of the relevant points associated with the component physical part;

receiving tracker data from the TFM comprising measured coordinates of a portion of the relevant points of the component part;

comparing the measured coordinates with the pre-stored geometry data;

computing the docking position of the TFM on the component physical part, if a match is found between the measured coordinates and the geometry data of corresponding relevant points;

determining a remainder of the relevant points of the component physical model based on the computed docking position and geometry data.

33. The program storage device of claim 32, further comprising instructions for performing the steps of rendering images of the component physical part each having an alternative docking position, if a match is not found between the measured coordinates and the geometry data for a user to select the image with a desired docking position.

34. The program storage device of claim 28, wherein the instructions for performing the step of obtaining coordinate data for each of the relevant points of the component physical part comprise instructions for performing the steps of:

receiving tracker data from the TFM comprising measured coordinates of successive relevant points of the component part;

rendering an image of the component physical part, wherein the image is dynamically generated by connecting a line from a current measured point to a last measured point; and

re-connecting the line from the current measured point to any previous measured point, in response to a signal sent by the user.

35. The program storage device of claim 28, wherein the instructions for performing the step of processing the coordinate data for each of the relevant points to determine the position and orientation of each of the relevant points of the component physical part in relation to the TFM comprise instructions for performing the steps of:

computing coordinates of the docking position of the TFM on the component physical part; and

transforming the coordinates of the relevant points to the coordinates of the TFM using the computed docking position.

36. The program storage device of claim 27, further comprising instructions for performing the step of refining the CAD representation before adding the CAD representation to the CAD model.

37. The program storage device of claim 27, further comprising instructions for performing the step of storing the CAD representation of the component physical part in a CAD library.